Remarks

This Amendment is in response to the Final Office Action dated **February 28, 2005.** In the Office Action, claims 9-16 were objected to because of informalities. Claims 9-16 were rejected under 35 U.S.C. 102(e). New claims 17-20 have been added. No new matter has been added with the amendments.

Claim Objections

Claim 9 was objected to because the phrase "the stent having" on line 11. Applicant has amended the claim without prejudice or disclaimer to further the prosecution of the application thereby mooting the rejection.

Claims 9-16 were objected to because the language of varying flexibility from one segment to another lacks antecedent basis from the rest of the specification. Applicant has amended the claims without prejudice or disclaimer thereby mooting the rejection.

Claim Rejections

Claims 9-16 are rejected under 35 USC 102(e) as being anticipated by Kleshinski et al. (US 5,902,317).

Claim 9 has been amended by eliminating some of the claim recitations and adding the recitation that a plurality of connecting members connect adjacent annular elements to form a plurality of cells which are bounded at a first end by a portion of one annular element, at a second end by a portion of another annular element and two connecting members which extend between the one annular element and the other annular element, the first end offset in a circumferential direction from the second end.

This combination of features in not found in Kleshinski. For example, the ends of the Kleshinski cells are not offset from one another in a circumferential direction.

Therefore, claim 9 and claims dependent therefrom are patentable over Kleshinski.

Claim 16 has been amended by eliminating some recitations and by adding the limitation that a plurality of connecting members connect adjacent annular elements from peak to

trough to form a plurality of cells, with each cell having an area. Each connecting member has a first end and a second end, the second end offset in a circumferential direction from the first end.

This combination of features is not disclosed in Kleshinski. For example, to the extent that Kleshinski includes connectors, the connectors do not have first and second ends which are offset in a circumferential direction.

For at least these reasons, the instant claims are patentable over Simon.

List of applications claiming priority from the same parent application

A list of copending applications is provided below in response to the Examiner's request for such a list. Copies of the pending claims from the non-published applications are submitted herewith. Applicants have marked these papers as confidential, given that the applications have not yet published. Applicant requests that these documents be maintained as confidential until the applications are published.

Applicants also note that application no. 10/194854 which was formerly pending has now issued as 6913619.

US Application No.	Published
09/666866	Not published
09/599674	Not published
09/197278	Not published
10/705273	US20040181276
10/728513	US20040088044
10/800572	US20040176934
10/817508	US 2004-0230296 A1

Conclusion

Claims 9-20 are believed to be in condition for allowance. Withdrawal of the objections and rejections is requested.

Respectfully submitted,

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Pending Claims of U.S. application No. 09/666866:

57. A tubular, flexible, expandable stent having a proximal end and a distal end and comprising:

a plurality of cylindrical shaped segments aligned on a common longitudinal axis to define a generally tubular stent body, each segment having a proximal end and a distal end, each segment being defined by an undulating pattern of interconnected struts to define the periphery of the stent body, circumferentially adjacent struts interconnected at only one end of the struts; and

a plurality of interconnecting elements, each interconnecting element extending from an interconnected end of adjacent struts on one segment to a circumferentially offset interconnected end of adjacent struts on an adjacent segment, each interconnecting element having a proximal end and a distal end, the distal end offset in a circumferential direction and in a longitudinal direction from the proximal end;

the stent including cylindrical shaped segments which have interconnecting elements extending from the distal end of the segment and from the proximal end of the segment, each interconnecting element which extends from the distal end of the segment connected to an interconnecting element which extends from the proximal end of the segment via three struts of the segment;

the stent further including end segments and intermediate segments, each of the struts of the end segments being longer than the struts of the intermediate segments of the stent;

whereby, upon expansion of the stent, struts of adjacent segments are displaced relative to each other about the periphery of the stent body to accommodate longitudinal flexing of the stent within the segments and without interference between adjacent segments.

67. A substantially cylindrically shaped stent having a longitudinal axis,

the stent comprising a plurality of closed undulating segments, the undulating segments extending circumferentially about the stent,

each undulating segment having a first end and a second end, the first end characterized by a plurality of end portions separated by gaps, the second end characterized by a plurality of end portions separated by gaps, the gaps on the first end

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circumferentially offset from the gaps on the second end and the end portions on the first end circumferentially offset from the end portions on the second end,

one of the undulating segments located at a first end of the stent having a plurality of interconnecting elements extending from one end of the segment only to a segment adjacent thereto and one of the undulating segments located at a second end of the stent having a plurality of interconnecting elements extending from one end of the undulating segment only to an undulating segment adjacent thereto,

there being a plurality of intermediate undulating segments which are located between the segments at the first and second ends of the stent, each intermediate undulating segment having interconnecting elements extending from the first and second ends of the

intermediate undulating segments, the interconnecting elements extending from less than all of the end portions at both ends of the intermediate undulating segments,

each interconnecting element extending from an end portion of an undulating segment to an end portion of an undulating segment adjacent thereto,

each interconnecting element having a proximal end and a distal end, the distal end being offset in both a circumferential direction and a longitudinal direction from the proximal end.

79. The stent of claim 84 wherein each interconnecting element is substantially straight.

80. The stent of claim 84 wherein the stent further includes end segments and intermediate segments and the end segments of the stent include longer struts than the intermediate segments of the stent.

83. The stent of claim 84 comprising interconnecting elements which are circumferentially adjacent one another and are separated from one another by six struts on each of the cylindrical shaped segments from which they extend.

84. A tubular, flexible, expandable stent having a proximal end and a distal end and a sidewall with a plurality of openings therethrough, the stent comprising:

a plurality of cylindrical shaped segments aligned on a common longitudinal axis to define a generally tubular stent body, each segment being defined by an undulating pattern of interconnected struts to define the periphery of the stent body,

circumferentially adjacent struts interconnected at only one end of the struts; and

a plurality of interconnecting elements, each interconnecting element extending from an interconnected end of circumferentially adjacent struts on one segment to an interconnected end of circumferentially adjacent struts on an adjacent segment, each interconnecting element having a proximal end and a distal end, the distal end circumferentially and longitudinally offset from the proximal end;

the stent including cylindrical shaped segments having at least three struts extending between each interconnecting element extending distally from the cylindrical shaped segment and the nearest interconnecting element extending proximally from the cylindrical shaped segment,

wherein each of the openings in the sidewall is bounded by two interconnecting elements and portions of two different adjacent cylindrical shaped segments.

89. A tubular, flexible, expandable stent, comprising:

a plurality of cylindrical shaped segments aligned on a common longitudinal axis, each segment having a proximal end and a distal end and being defined by a member formed in a closed undulating pattern of interconnected struts, circumferentially adjacent struts interconnected at only one end of the struts at an interconnected end portion and

a plurality of interconnecting elements each extending from one segment to an adjacent segment, some of the segments having interconnecting elements extending from the distal end of the segment and from the proximal end of the segment, the interconnecting elements which extend from the distal end of the segment connected to the interconnecting elements which extend from the proximal end of the segment via three struts of the segment,

each interconnecting element extending from one interconnected end portion of one segment to another interconnected end portion of another adjacent segment but not to an oppositely positioned end portion of an adjacent segment.

90. A substantially cylindrically shaped stent having a longitudinal axis,

the stent comprising a plurality of closed undulating segments, the undulating segments extending circumferentially about the stent,

each undulating segment having a first end and a second end, the first end characterized by a plurality of end portions separated by gaps, the second end characterized by a plurality of end portions separated by gaps, the gaps on the first end circumferentially offset from the gaps on the second end and the end portions on the first end circumferentially offset from the end portions on the second end,

an undulating segment at a first end of the stent having a plurality of interconnecting elements extending from one end of the segment only to a segment adjacent thereto and an undulating segment at a second end of the stent having a plurality of interconnecting elements extending from one end of the undulating segment only to an undulating segment adjacent thereto,

a plurality of undulating segments which are located between the segments at the first and second ends of the stent having interconnecting elements extending from less than all of the end portions at both ends of the segments,

each interconnecting element having a proximal end extending from an end portion of one undulating segment and a distal end extending from an end portion of an undulating segment adjacent to said one undulating segment,

each interconnecting element having a proximal end and a distal end, the distal end circumferentially and longitudinally offset from the proximal end, the interconnecting elements oriented diagonally to the longitudinal axis of the stent.

91. The stent of claim 90 wherein the stent is made of metal.

92. The stent of claim 91 wherein the metal is a shape memory alloy.

93. The stent of claim 90 wherein the stent forms a thin-walled tubular member.

94. The stent of claim 90 formed as a self-expanding configuration.

95. The stent of claim 90 formed as a mechanically expandable configuration.

96. The stent of claim 90 wherein the interconnecting elements between adjacent segments are of the same length.

97. The stent of claim 84 wherein the struts of at least one cylindrically shaped segments are longer than the struts of an adjacent undulating circumferential band.

98. The stent of claim 84 wherein the stent is expandable from an unexpanded state to an expanded state, in the unexpanded state at least a portion of the interconnected struts being parallel to one another.

99. The stent of claim 84 constructed and arranged to be self-expanding.

100. The stent of claim 84 constructed and arranged to be balloon expandable.

101. The stent of claim 84 wherein the stent is constructed from a shape memory material.

102. The stent of claim 84 wherein the end portions of adjacent cylindrical shaped segments are not longitudinally opposite one another.

103. The stent of claim 102 wherein the interconnected struts having a length, the length of the struts of the cylindrical shaped segments at each end of the stent being different than the length of the struts of the cylindrical shaped segments positioned therebetween.

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Pending Claims of U.S. application No. 09/599674 (application allowed):

9. A cylindrical stent formed from a single piece of metal, the stent comprising a multiplicity of sets of strut members with each set of strut members forming a closed cylindrical structure having a longitudinal axis collinear with a longitudinal axis of the stent, the closed structure comprised of interconnected strut members, each strut member connected at a first end to an adjacent strut member and at a second end to another adjacent strut member, in an expanded state of the stent each strut member being non-parallel to the longitudinal axis, adjacent sets of strut members being coupled each to the other by connectors, each of said connectors being diagonal relative to the longitudinal axis, said stent having a proximal end, a distal end and a center section located approximately half-way between said proximal and distal ends, said stent having two types of circumferentially extending closed cylindrical structures, a first type of set of strut members and a second type of set of strut members, the first type of set of strut members having a shorter total circumferential length as compared to the total circumferential length of the second type of set of strut members, only the set of strut members at the distal end of the stent and only the set of strut members at the proximal end of the stent being the second type of set of strut members, the stent when expanded having a uniform diameter and having the first type of set of strut members having greater radial rigidity as compared to the second type of set of strut members.

10. The stent as recited in claim 9 where said first type of set of strut members has a length that is less than the length of said second type of set of strut members.

11. The stent as recited in claim 9 where there is at least one of the first type of set of strut members at said center section of the stent.

12. The stent as recited in claim 9 where said stent is balloon expandable.

13. The stent as recited in claim 9 where said stent is a radially self-expanding stent.

14. The stent as recited in claim 9 where said stent is a mechanically expandable stent.

17. The stent of claim 9 wherein the connectors are disposed at an oblique angle relative to the longitudinal axis of the stent.

18. A stent formed from a single piece of material, the stent comprising a multiplicity of

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sets of strut members with each set of strut members forming a serpentine closed cylindrical structure which forms a circumference of the stent, the closed structure comprised of strut members, each strut member connected at a first end to one adjacent strut via a curved end segment and at a second end to another adjacent strut via another curved end segment, the curved end segments being of the same length, adjacent closed cylindrical structures being coupled each to the other by connectors, each connector being diagonal relative to a longitudinal axis of the stent, said stent having a proximal end, a distal end and a center section located approximately half-way between said proximal and distal ends, said stent having two types of circumferentially extending sets of strut members, a first type of set of strut members and a second type of set of strut members, the first type of set of strut members forming a path that follows along the serpentine closed structure of one of the sets of strut members about the periphery of the stent which has a shorter total length as compared to the total length of a pathway that follows along the serpentine closed structure of another of the sets of strut members about the periphery of the stent formed by the second type of set of strut members, only the set of strut members at the distal end of the stent and only the set of strut members at the proximal end being the second type of set of strut members, the stent when expanded having a uniform diameter and having the first type of set of strut members having greater radial rigidity as compared to the second type of set of strut members.

19. The stent of claim 18 wherein the connectors are disposed at an oblique angle relative to the longitudinal axis of the stent.

20. The stent of claim 18 wherein the circumferentially extending closed structure is in the form of a cylindrical zig-zag.

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Pending Claims of U.S. application No. 09/197278:

39. A stent with a proximal end, a distal end and a longitudinal axis, the stent comprising:

a plurality of undulating band-like elements having a plurality of turns forming alternating peaks and troughs, each undulating band-like element extending about the longitudinal axis, the plurality of undulating band-like elements extending from the proximal end of the stent to the distal end of the stent, adjacent undulating band-like elements separated by gaps which are shorter in longitudinal length than the undulating band-like elements,

the plurality of undulating band-like elements including a first undulating band-like element, a second undulating band-like element and a third undulating band-like element, the second undulating band-like element disposed between the first and third undulating band-like elements, and

a plurality of substantially linear interconnecting elements extending between undulating band-like elements which are adjacent one another, each interconnecting element having a first end and a second end which is offset circumferentially and longitudinally along the stent from the first end, interconnecting elements which are circumferentially adjacent one another separated by a plurality of turns along each of the undulating band-like elements which they connect,

the plurality of interconnecting elements including first interconnecting elements and second interconnecting elements,

the first interconnecting elements extending between peaks on the first undulating band-like element and troughs on the second undulating band-like element, the number of peaks on the first undulating band-like element exceeding the number of first interconnecting elements, the second interconnecting elements extending between peaks on the second undulating band-like element and troughs on the third undulating band-like element, the number of peaks on the second undulating band-like element exceeding the number of second interconnecting elements,

wherein the number of peaks of the first undulating band-like element separating circumferentially adjacent first interconnecting elements is less than the number of peaks

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of the second undulating band-like element separating circumferentially adjacent second interconnecting elements.

40. A stent with a proximal end, a distal end and a longitudinal axis, the stent comprising:

a plurality of undulating band-like elements having alternating peaks and troughs, each undulating band-like element extending about the longitudinal axis, the plurality of undulating band-like elements extending from the proximal end of the stent to the distal end of the stent, adjacent undulating band-like elements separated by gaps which are shorter in longitudinal length than the undulating band-like elements,

the plurality of undulating band-like elements including a first undulating band-like element, a second undulating band-like element, a third undulating band-like element, and a fourth band-like element, the second undulating band-like element disposed between the first and third undulating band-like elements, the third undulating band-like element disposed between the second and fourth undulating band-like elements, and

a plurality of interconnecting elements extending between undulating band-like elements which are adjacent one another, each interconnecting element having a first end and a second end which is offset circumferentially and longitudinally along the stent from the first end,

the plurality of interconnecting elements including first interconnecting elements, second interconnecting elements, and third interconnecting elements,

the first interconnecting elements extending between peaks on the first undulating band-like element and troughs on the second undulating band-like element, the number of peaks on the first undulating band-like element exceeding the number of first interconnecting elements, the second interconnecting elements extending between peaks on the second undulating band-like element and troughs on the third undulating band-like element, the number of peaks on the second undulating band-like element exceeding the number of second interconnecting elements, the third interconnecting elements extending between peaks on the third undulating band-like element and troughs on the fourth undulating band-like element,

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the number of peaks of the first undulating band-like element separating circumferentially adjacent first interconnecting elements being less than the number of peaks of the second undulating band-like element separating circumferentially adjacent second interconnecting elements

wherein each second interconnecting element is separated from the third interconnecting element nearest to it by a single peak of the third undulating band-like element and a single trough of the third undulating band-like element.

41. The stent of claim 40 where one third interconnecting element extends from every third peak of the third undulating band-like element.

43. The stent of claim 40 where the interconnecting elements are substantially linear.

44. The stent of claim 41 where the interconnecting elements are substantially linear.

45. The stent of claim 40 wherein the first undulating band-like element is characterized by a first amplitude and the second undulating band-like element is characterized by a second amplitude, the first amplitude greater than the second amplitude.

46. A stent with a longitudinal axis, the stent comprising:

a plurality of undulating band-like elements having alternating peaks and troughs, each undulating band-like element extending about the longitudinal axis, the plurality of undulating band-like elements including a proximal undulating band-like element of a single first wavelength and single first amplitude having alternating peaks and troughs, an intermediate undulating band-like element of a single second wavelength and single second amplitude having alternating peaks and troughs, and a distal undulating band-like element of the first wavelength and first amplitude having alternating peaks and troughs, the intermediate undulating band-like element disposed between the proximal and distal undulating band-like elements, and

a plurality of interconnecting elements extending between undulating band-like elements which are adjacent one another, each interconnecting element having a first end and a second end which is offset circumferentially and longitudinally along the stent from the first end,

the plurality of interconnecting elements including first interconnecting elements and second interconnecting elements,

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the first interconnecting elements extending between peaks on the proximal undulating band-like element and troughs on the intermediate undulating band-like element,

the second interconnecting elements extending between peaks on the intermediate undulating band-like element and troughs on the distal undulating band-like element,

wherein the first ends of the first interconnecting elements extend from every third peak of the proximal undulating band-like element and the second ends of the second interconnecting elements extend from every third trough of the distal undulating band-like element.

47. The stent of claim 46 wherein the plurality of undulating band-like elements further comprises a second distal undulating band-like element having alternating peaks and troughs, the second distal undulating band-like element distal to the distal undulating band-like element,

the plurality of interconnecting elements including third interconnecting elements extending between peaks on the distal undulating band-like element and troughs on the second distal undulating band-like element,

wherein each second interconnecting element is separated from the third interconnecting element nearest to it by a single peak and a single trough of the distal undulating band-like element.

48. The stent of claim 47 wherein the interconnecting elements are linear.

49. The stent of claim 48 wherein the first amplitude is greater than the second amplitude, and the first wavelength is greater than the second wavelength.

50. A stent with a longitudinal axis, the stent comprising:

a plurality of undulating band-like elements having alternating peaks and troughs, each undulating band-like element extending about the longitudinal axis, undulating band-like elements which are adjacent one another separated by a gap which is shorter in longitudinal length than each of the adjacent undulating band-like elements, the plurality of undulating band-like elements including a first undulating band-like element and a second undulating band-like element, the first and second undulating band-like elements adjacent one another, and

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a plurality of substantially linear interconnecting elements extending between undulating band-like elements which are adjacent one another, each interconnecting element having a first end and a second end which is offset circumferentially and longitudinally along the stent from the first end, the plurality of interconnecting elements including first interconnecting elements, the first interconnecting elements extending between peaks on the first undulating band-like element and troughs on the second undulating band-like element, there being fewer interconnecting elements extending between the first and second undulating band-like elements than peaks on the first undulating band-like element, first interconnecting elements which are adjacent one another connected to each other via a first path along the undulating first band-like element, the first path having a first length, the first path being the shortest path along the first undulating band-like element which connects adjacent first connecting elements, and via a second path along the undulating second band-like element, the second path having a second length, the second path being the shortest path along the second undulating band-like element which connects adjacent first connecting elements, adjacent first interconnecting elements and the first and second paths which connect them defining one cell,

wherein the first path length is different from the second path length.

52. The stent of claim 50 wherein the first and second undulating band-like elements are characterized by different amplitudes.

53. The stent of claim 50 wherein the first path length is longer than the second path length.

54. A stent having a plurality of cells, the stent comprising:

a plurality of undulating band-like elements having alternating peaks and troughs, the plurality of undulating band-like elements including a first undulating band-like element, a second undulating band-like element and a third undulating band-like element, the first, second and third undulating band-like elements disposed sequentially along the length of the stent, and

a plurality of substantially linear interconnecting elements extending between undulating band-like elements which are adjacent one another, each interconnecting element having a first end and a second end which is offset circumferentially and

longitudinally along the stent from the first end, the interconnecting elements shorter in length than the undulating band-like elements which they connect,

the plurality of interconnecting elements including first interconnecting elements extending between peaks on the first undulating band-like element and troughs on the second undulating band-like element and second interconnecting elements extending between peaks on the second undulating band-like element and troughs on the third undulating band-like element, first interconnecting elements which are adjacent one another connected to each other via a first path along the first undulating band-like element, the first path spanning a plurality of peaks and troughs and being the shortest path along the first undulating band-like element between adjacent first interconnecting elements, second interconnecting elements which are adjacent one another connected to each other via a second path along the second undulating band-like element, the second path having a second length, the second path spanning a plurality of peaks and troughs and being the shortest path along the second undulating band-like element between adjacent second interconnecting elements, the first path length different from the second path length,

wherein each of the cells between the first and third undulating band-like elements is bounded by two interconnecting elements, a portion of the second undulating band and a portion of either the first or the third undulating band-like element.

56. The stent of claim 54 wherein the first and second undulating band-like elements are characterized by different amplitudes.

57. The stent of claim 54 wherein the first path length is longer than the second path length.

58. The stent of claim 46 wherein the first amplitude is equal to the second amplitude and the first wavelength is equal to the second wavelength.

59. A stent extending about a longitudinal axis, the stent comprising a plurality of interconnected alternating first and second serpentine circumferential bands,

each of the first serpentine circumferential bands which alternate with the second serpentine circumferential bands having a first number of turns, each of the second serpentine circumferential bands characterized by a second number of turns, the first number of turns exceeding the second number of turns, the length of the first bands as

measured in a longitudinal direction exceeding the length of the second bands as measured in a longitudinal direction,

the first and second serpentine circumferential bands arranged such that one second serpentine circumferential band is provided between every two successive first serpentine bands and connected thereto, and one first serpentine circumferential band is provided between every two successive second serpentine bands and connected thereto,

the interconnected alternating first and second serpentine circumferential bands defining a plurality of cells each of which is bounded at one end by an end wall comprising a plurality of turns of a first serpentine circumferential band and at another end by another end wall comprising a plurality of turns of a second serpentine circumferential band, each of said cells which are defined by the interconnected first and second serpentine circumferential bands at least partially abutting another such cell and having a portion of an end wall in common with the such cell,

each end wall of a cell having a connected turn which is connected to another longitudinally adjacent end wall and a plurality of unconnected turns, the unconnected turns not being connected to the longitudinally adjacent end wall.

60. The stent of claim 54 wherein the peaks and troughs are bulbous.

61. The stent of claim 54 wherein fewer than three interconnecting elements extend between adjacent undulating band-like elements.